

# OPERATING INSTRUCTIONS for flow meters of the product line "Ex-Type VS"



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## Important Basic Information

### Dear Customers and Users,

These installation and operating instructions should convey to you the information necessary for the proper and conventional installation and initial start-up of the flow meter in explosive areas. The installation, start-up and examination are to be carried out exclusively by qualified and trained personnel with knowledge of the relevant national regulations for explosion protection. These operating instructions must be read and applied carefully to ensure that the trouble-free, proper and safe operation of the flow meter. VSE accepts no liability for damage which occurs as a result of non-compliance with the information in these operating instructions. It is strictly forbidden to open the devices.

These operating instructions for the flow meter of the "Ex-type VS" production series must be placed where they are accessible at all times to the authorized personnel. Chapters must never be removed from this manual. Missing operating instructions or missing pages must be replaced immediately. VSE will supply you with new ones at any time or you can download them from the internet ([www.vse-flow.com](http://www.vse-flow.com)). The operating instructions must be passed on to each subsequent user of this product.

### Legal References

This document is not subject to the revision service through the VSE Volumentechnik GmbH.

Revisions can be made on this document without further announcement.

The VSE Volumentechnik GmbH issues not tacit guarantees for customary quality and suitability for a certain purpose.

After the arbitrary opening or alteration of the device or after a singular improper connection of the circuit, the ex-protection is no longer applicable and thus the guarantee and warranty of the VSE Volumentechnik GmbH for safe operation in explosive areas is also no longer applicable. VSE Volumentechnik GmbH assumes no liability whatsoever for personal or material damage which occurs as a result of improper installation and improper operation of the flow meter.

## • General function description of flow meter for use in explosion-prone areas

VS positive displacement flowmeters are volume rate measuring sensors based on the meshing gear principle and are designed for use with liquids. Two precisely matched gear wheels are enclosed in a very accurately machined housing. Gear rotation is sensed by a non-contacting signal pick-up system. Each tooth produces one impulse. The space between the gear teeth, when fully enclosed on both sides by the housing, constitute measuring chambers. Fluid flow causes the gears to rotate and the incoming flow is separated into discrete volumes within these chambers i. e. the volume of liquid passing through the unit will cause rotation of the gears by exactly

one tooth pitch. This volume is known as the Volume / Impulse (Vm) and is stated in cc/Imp. It is used to define the size of a flowmeter.

The ex-type flow meters of the production series "VS" are used in explosion-prone areas. The pre-amplifier of this "Ex-type" supplies two modulated digital current signals which are staggered at 90° to one another. The frequency of these signals is proportional to the current flow.

These separate switching currents are digitalized and amplified by two single-channel isolation switching amplifiers.

## • Flow meter selection

For trouble-free and safe operation of the flowmeters the correct selection of type and size is imperative. Due to the great number of different applications and flowmeter versions, the technical data in the VSE-catalogues are of general character. Certain characteristics

of the devices depend on type, size and measuring range as well as on the medium to be measured. For exact flowmeter choice, please contact VSE.

## • Declaration of Conformity

Flow meters of the "VS" product line for explosion-prone areas are tested for their electromagnetic compatibility and interference transmission in terms of the law on electro-magnetic compatibility and correspond to the legal prescriptions enforced by EMC directives. They may not be operated independently they are to be connected via cable to a power source and supply digital electric signals for electronic evaluation.

**The electromagnetic compatibility of the total measuring system depends on cable layout, correct connection of protective shielding and each single connected device, user ensure that all components correspond to the electromagnetic compatibility directives and that the electromagnetic compatibility of the total system, machine or plant is guaranteed.**

All flow meters are tested according to the valid, legally prescribed electromagnetic compatibility directives EN 55011 and EN 61000.

Ex-type "VS" flow meters are approved for use in explosive areas and fulfill the basic safety and health requirements for the design and construction of devices and protective systems in accordance with the guideline 94/9/EC (ATEX 95).

Through their compliance with the European norms EN 50014, EN 50020 and EN 50284, the devices fulfill these safety and health requirements and have been certified by an accredited admissions agency. An EC-type examination certificate is on page 26. The EC declaration of conformity is the CE label attached to all flow meters.

All flow meters are designed in accordance with the valid statutory regulations.

## • General conditions for initial start-up

Before assembly and before initial start-up, you have to note the following properties and aspects of the corresponding characteristics of your system, so that a trouble-free and safe operation is possible.

### 1. The process fluid

- Is the **flow meter suitable for the fluid**?
- Is the fluid **viscous** or **abrasive**?
- Is the fluid **contaminated** or is there **solid matter in the fluid**?
- Which **granular size** does the solid matter possess and can it **block the meter**?
- Does the fluid have **fillers** or other **additional material**?
- Is it necessary to install a pre-switched **hydraulic filter**?
- Are the **pipe lines clean** and free of assembly residues such as swarf, weld chips?
- Is the **tank clean** and is it ensured that **no extraneous materials** can get into the pipe-line system from the tank?
- Is the fluid often changed and is **sufficient flushing performed in this case**?
- Are the pipe lines and the entire system completely **de-aerated**?
- What **cleaning agent** is being used?
- Are the fluid and the cleaning agent compatible with the **seals**?
- Are the **seals suitable** for the fluid undergoing measurement (**seal compatibility**)?

## 2. The hydraulic properties of the system

- Is the **max. operating pressure of the system** lower than the max. permitted operating pressure of the flow meter?
- Is the max. **pressure drop  $\Delta p$**  (on flow meter) below the max. permitted pressure drop?
- Does an excessively **great drop in pressure  $\Delta p$**  occur on the flow meter at max. flow (e.g. with higher viscosity)?
- Does the flow range of the flow meter (depending on viscosity) correspond to the **provided flow**?
- Note that flow range decreases the **greater the viscosity!**
- Does the temperature range of the flow meter correspond to the **provided max. temperature** of the medium?
- Is the **cross section** of the pipe line large enough and are the pressure drops in the system not excessive?
- Is the **hydraulic connection** (supply and reverse flow) correctly connected and leak-proof?
- Has the **pump** sufficient power to operate the system?
- A blocking flow meter can stop the whole flow. Is a **pressure control valve / bypass** provided in the system?

## 3. Electronic evaluation and electrical safety

- Have you selected the optimal flow meter and is this equipped with the **appropriate pre-amplifier**?
- Does the **power supply voltage** of the flow meter correspond to the provided voltage?
- Is the power supply voltage supplied by the power adapter or evaluation unit **sufficiently steady**?
- Does the **output** of the power supply voltage correspond to the required power output?
- Has the electric connection been installed based on the enclosed **connection plan**?
- Is the flow meter connected securely to the **earth conductor PE**?
- Is the meter of the flow meter constructed to be **insulated** to the earth conductor PE (e.g. connection via hoses)? If this is the case, the meter has to be connected with the earth conductor PE!
- Does a correcting lead have to be laid to eliminate the **potential difference** between the flow meter and the receiver?
- It must be ensured to the highest extent that **potential equalization** exists for the entire system.
- Is the cable laid fault-free and the installation secured from input of **interference pulses**?
- Is the **4-pin round plug** of the connection cable firmly screwed together with the plug of the flow meter?
- Are the **wires on the evaluation unit and the switching amplifiers** correctly and properly connected?
- Does the entire system correspond to the directives of the electro-magnetic compatibility laws (**EMC**)?
- Have all local valid regulations, **applicable directives**, guidelines and background conditions of the **electro-magnetic compatibility laws** been maintained and observed?
- Were all legal **regulations and guidelines** for **ex-protection** observed during the installation of the flow meters and other system components?
- Systems that can lead to personal injury through malfunction or failure are to be equipped with the **appropriate safety devices**. The functioning of these safety devices is to be checked at **regular intervals**.

### • Maximum operating pressure

Before assembling the flow meter, you must check that the **max. operating pressure** of the system does not exceed the max. permitted operating pressure of the flow meter. In the process observe the highest pressures that can occur when operating the system.

The following operating pressures are permitted depending on flow meter

- Flow meter in grey cast iron version  $p_{\max} = 315 \text{ bar} / 4568 \text{ psi}$
- Flow meter in stainless steel version  $p_{\max} = 450 \text{ bar} / 6526 \text{ psi}$
- Flow meter in special version  $p_{\max} = \text{up to } 700 \text{ bar} / 10150 \text{ psi}$

### Important:

**Please consult VSE for all operating pressures > 450 bar and for special versions.**



### • Flow meter range

The flow meter range specified in the flow meter data sheet ( $Q_{\min} - Q_{\max}$ ) refers to the testing fluid hydraulic oil with a viscosity of  $21 \text{ mm}^2/\text{s}$  at a temperature of  $20^\circ\text{C}$ . For this flow meter range, VSE specifies measurement accuracy of up to 0.3% of the measurement value and a repetition accuracy of 0.05%.

For fluids of lower viscosity ( $< 21 \text{ mm}^2/\text{s}$ ) measurement accuracy deteriorates, while for fluids of higher viscosity ( $> 21 \text{ mm}^2/\text{s}$ ) it can improve. The higher the viscosity, the higher the flow resistance  $\Delta P$ . Also note, however, that the flow meter range is restricted in case of higher viscosity (see flow meter data sheet).

**Important:**

**Make sure that the specified maximum permitted operating pressure of the flow meter cannot be exceeded, at any operating mode of the system. Note the flow meter range that is dependent on the viscosity of the fluid to be measured.**



• **Installation of the flow meter**

The flow meter should be mounted on an easily accessible location, so that it can be removed easily for cleaning.

Since flow meters can work in any installation position and flow direction, you can mount it on any location of your system that you wish. Take care when installing the flow meter that liquid always remains in the flow meter even at system standstill and that it can never run empty.

The outflow of the flow meter should therefore always show a certain back pressure. In critical cases or when the pipe line is at standstill or standby and can run empty, we recommend installing an extra non-return valve in the outflow line.

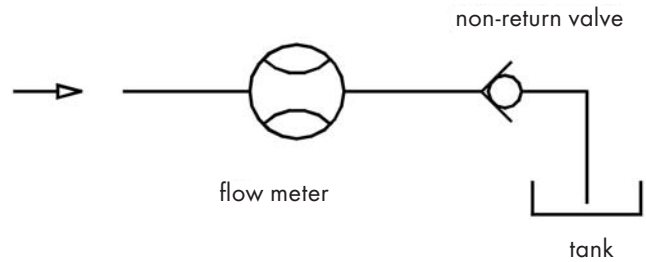


Fig. 1: Flow meter installation with non-return valve

**Important:**

**Make sure that the flow meter is always completely filled both in inflow and outflow and that the outflow has a little back pressure. This prevents the meter being damaged by a sudden and steep increase of flow and at the same time improves measurement accuracy.**



Flow meters of the "VS" product line can be mounted directly onto a block or into the pipeline using four screws. Always select large cross sections for the hydraulic supply and return flow respectively for the entire pipeline system (if possible). This lowers the drop in pressure and the flow rate in the overall system.

→ **Block assembly:**

The flow meter is directly mounted onto a subplate. The subplate is installed in the pipeline, is attached with four screws to a mounting panel, console or device wall, and has all the necessary hydraulic connections and screw holes for mounting the flow meter.

VSE supplies subplates for all flow meters of the "VS" product line; they have various pipe threads and side or rear-side connection (see subplates data sheet). Depending on the provided conditions, the installed pipe line, the pipe cross section or pipe thread, the operator can choose the suitable subplate and incorporate this into the system or machine without additional reductions.

The flow meter is screwed onto the block or subplate with four DIN 912 cheese head screws. The screws are to be pre-tensed crosswise evenly with the following torques.

**Table 1: Torque of fastening screws**

Flow meter, size (cast iron and 1.4305)	Torque
VS 0.02; VS 0.04; VS 0.1; VS 0.2	40 Nm
VS 0.4; VS 1; VS 2	70 Nm
VS 4	120 Nm
VS 10	280 Nm

Please note the special instructions for mounting sizes VS 4 and VS 10 (see appendix)

**Important:**

**When mounting the flow meter, you must take great care that the seals are not damaged and correctly placed in the hydraulic connections of the flow meter. Wrongly installed or damaged seals lead to leakage and to an leaky system, which may have dire consequences. Please make sure that flow meters with EPDM seals do not come into contact with oil and greases on a mineral oil basis. These fluids can decompose the seals. The yellow plastic plugs in the hydraulic connections of the flow meter protect the meter against dirt and contamination during storage and shipping. Before mounting the flow meter you have to remove these plugs so that inflow and outflow are free and open.**



• **Cleaning and flushing of pipe lines before initial start-up**

Before initial start-up of the flow meter, you must flush and clean the whole system. Contaminated fluids can affect the correct function of the flow meter or seriously damage the meter.

After preparing and connecting up the system pipes, you must first carefully flush and clean the whole pipeline system and the tank. To do this, you have to mount a diversion plate onto the block or connection plate instead of the flow meter, so that the fluid can flow through the diversion plate and all extraneous material (e.g. swarf, metal chips, etc.) can be flushed out without obstruction. As a cleansing agent, use a fluid which is compatible with the fluid being used later and which does not cause undesirable re-actions. You can consult the suppliers and manufacturers of the fluid or contact VSE

for the corresponding information. VSE supplies bypass-plates which are corresponding for all "VS"-flow meter sizes.

Flow meters are measurement pick-up systems made with high-level precision. They have a mechanical meter consisting of two toothed wheels and which is adapted to the housing with narrow slots. Even the tiniest damage to the toothed wheels and bearings can cause a measurement error. So always make sure that no extraneous material gets into the meter and that the fluid flowing through is always free from dirt and contamination.

After the system has been carefully flushed out and no extraneous material is in the pipe line, you can mount the flow meter and commence the initial start-up.

**Important:**

**Please flush out the pipelines and the tank thoroughly, to prevent contamination with the flow meter.**



• **Filtering of liquid**

Heavily contaminated fluid or extraneous material in the fluid can block, damage or even destroy the flow meter. In such cases, always install a sufficiently large filter in front of the flow meter to prevent damage to the flow meter. The filtering necessary depends on size, bearing system and model of flow meter.

**Table 2: Pre-switched filters**

Flow meter size	Filter size for ball bearings
VS 0.02 / 0.04 / 0.1	10 µm
VS 0.2 / 0.4	20 µm
VS 1 / 2 / 4 / 10	50 µm

For information on filter size for flow meters with plain bearings, in special version, or with specially adjusted meter tolerances, please consult VSE GmbH.

**Important:**

**A blocked flow meter can stop the whole flow. You have to provide a control valve/ bypass for the system.**



## • Flow meters in explosion-prone environments

The operation of flow meters in explosion-prone environments is subject to clearly defined legal regulations. For this reason only flow meters with a **certified ex-approval** may be used in explosive areas.

For personal and material protection, the lawmakers issued **national and international standards**, which have to be complied with when using electrical components and systems in explosive atmospheres. In Europe, the **CENELEC** – European Committee for Electrical Standardization – issues the harmonized standards for the explosion protection of electric equipment.

Danger of explosion can occur when handling flammable materials, i.e. materials which can oxidize, when these materials exist as gases (e.g. methane, propane), vapors, mist or dust, their concentration in a mixture with air lies within a certain range, and the mixture (flammable substance + oxygen) is hazardous. With an effective source of ignition, the explosion of these mixtures would be set off. During explosions, extremely high temperatures and a high velocity of pressure rise often occur. This could result in people being injured, buildings and system parts being destroyed and other flammable materials being ignited.

All electrical equipment which is installed and operated in explosion-prone rooms or spaces **must be approved for the corresponding zone** and must be equipped with a special type plate.

Explosive areas are divided into zones. The zones are divided according to the frequency and duration of the occurrence of the hazardous explosive atmosphere.

The **division into zones is a company decision**, for which the user as the operating company must be responsible himself. The definition of zones can be read about in the EN 1127-1 on the principles and methodology

of explosion protection. The EN 60079-10 and the example collection of explosion protection rules (Ex-RL) provide more information on zone divisions. Technical superintendents of the trade associations can provide assistance. But the user can always consult the ex-authority of a association for technical inspection for zone definitions. In any case, the consent of the industrial inspectorate must be secured.

The operation of electrical equipment and systems in explosion-prone environments is subject to clearly defined legal regulations. For this reason, in all explosion-prone areas only flow meters with the corresponding ex-approval and ex-type plate in connection with **certified safety features** (associated equipment) may be used.

The **Ex-type flow meters of the VSE GmbH** are typed according to the protection class "intrinsic safety" (i) and are operated with isolation switch amplifiers. These ensure the intrinsic safety of the signal circuits in accordance with set criteria and parameters, and their limiting values do not exceed the maximum input values of the device. Two isolation switching amplifiers are needed to operate an ex-type flow meter of the production series "VS". They come either in two separate housings or together in one housing.

The protection class "**intrinsic safety**" (i) implies that the energy in the circuit has to be so low, that ignitable sparks, electric arcs or temperatures cannot occur. When installing intrinsically safe circuits, detailed regulations must be followed. High demands are placed on the insulation in order to avoid a voltage diversion in the ex-area. Therefore, intrinsically safe circuits always must be laid separately from circuits which are not intrinsically safe. It is **not** permitted to lay cables, bunched circuits and cable harnesses together.

The category i (Intrinsic Safety DIN EN 50020) is subdivided into:

- ia = intrinsically safe when two independent errors occur
- ib = intrinsically safe when one error occurs

The European norms basically distinguish between two equipment **explosion groups**. Flow meters belong to **Group II** (electrical equipment for explosive areas).

Equipment in Group II is subdivided further into **explosions sub-groups and temperature classes**.

- IIA e.g. acetone, ammonia, benzene (pure), methane, propane,
- IIB e.g. ethylene, town gas (illuminating gas), hydrogen sulphide
- IIC e.g. carbon disulphide, acetylene, hydrogen

The most hazardous substances are assigned to the **Group IIC**. Devices which are approved in the Group IIC, may also be operated with substances from the Groups II A and IIB.

The **ignition temperature** (defined as the temperature at which a mixture self-ignites in a fixed test process) is directly associated with the temperature class.

The **temperature class** indicates the maximum surface temperature of the electrical equipment, and must be below the ignition temperature of the flammable substance in order to avoid an ignition.

The approved **ambient temperatures and media temperatures** for the Ex-type flow meters are determined in the corresponding temperature classes and **must be strictly maintained** (see page 24 „Maximum Permitted Media and Ambient Temperatures“).

The Ex-type of the VSE flow meter is executed in the category „ia“ and is approved for the Group IIC. Allowing for the approved media and ambient temperatures and the installation regulations, they can be used in the zones 0, 1 and 2 (for gases and vapors).

The VSE flow meters are **not** approved for use in areas prone to dust explosions!



### • General information for the use of devices with intrinsically safe circuits

The DIN EN 50014 contains general regulations for the type and inspection of electrical equipment intended for use in explosion-prone areas and defines the contents of the documentation which accompanies the devices. The national and **international regulations are to be strictly observed and complied with for specified normal operation** in explosion-prone areas. Following are a few references, especially in regard to the framework directives of the European Parliament 94/9/EG (ATEX 95).

Intrinsically safe equipment may be connected to the intrinsically safe terminals of the isolation switching amplifier. All equipment must fulfill the requirements for operation in the existing zone of the explosive area.

When interconnecting equipment, the "proof of intrinsic safety" must be documented (EN 60079-14). After connecting an intrinsically safe circuit to a circuit which is not intrinsically safe circuit even just once, the use as equipment with an intrinsically safe circuit is **no longer permitted**. This applies to the isolation switching amplifier as well as to the flow meter.

Corresponding regulations exist for the set-up of intrinsically safe circuits, the attachment of external connecting parts and for the properties and laying of the wires. Wires and terminals with intrinsically safe circuits are to be marked and separated reliably from circuits which are not intrinsically safe (EN 60079-14).

The **required distance** is to be maintained from the terminals of the switching amplifier to the grounded components and terminals of other devices. Unless stated explicitly in the device instructions, the approval for the device is terminated if it is opened for repairs or if alterations on the device are made by someone other than a specialist or the manufacturer.

Visible changes to the housing of the isolation switching amplifier (e.g. brown-black discolouration, holes and bulges) indicate a serious malfunction and the device must be turned off immediately. The connected flow meter must also be checked.

**Please note that only a specialist or the manufacturer may check the explosion protection of the device.**

The isolation switching amplifier may be operated only within the range of the approved specifications printed on the housing. Before starting each time or after changing the unit's interconnections, it must be ensured that the applicable provisions, regulations, guidelines and parameters are observed, that the use is as intended, and that the safety requirements have been fulfilled.

#### **Important:**

**The switching amplifier and the flow meter are to be installed and connected exclusively by trained and qualified personnel (authorized persons) with knowledge of the relevant, national regulations for explosion protection.**



For the operating company, the guidelines ATEX 95, ATEX 137 and the European norms EN1127-1, EN 60079-10, EN 60079-14, EN 60079-17 among others are of great importance and must be strictly applied to the construction, installation, operation, inspection and maintenance of its system in explosive areas.

### • VSE Ex-type flow meters

The VSE flow meters of the production series "VS Ex-type" are approved for use in explosive areas and are always operated together with one or two isolation switching amplifiers. They are marked in blue and afford the necessary explosion protection safety. The type plate contains the

designations, markings, and safety and electrical data required by DIN EN 50014 (see Page 24 "Labelling"). VSE delivers the flow meters with isolation switch amplifier models MK 13-P-Ex0/24VDC/K15.

### • The isolation switch amplifier MK 13-P-Ex0/24VDC/K15

The isolation switch amplifier MK 13-P-Ex0/24VDC/K15 allows a galvanic transmission of binary states. It has an intrinsically safe input circuit and is certified in accordance with II(1) GD [EExia] IIC. A galvanic isolation exists from the input circuit to the output circuit and to the supply voltage. For the transmission from two channels, two such isolation switching

amplifiers are required. The input circuit can be monitored for discontinuity and short circuits (the monitoring can be switched off by a wire jumper). Although an error in the input circuit blocks the signal output, it is not emitted as an error message. Two plus switching (PNP outputs), short circuit-proof transistor outputs emit a channel's digital signal as antivalent.

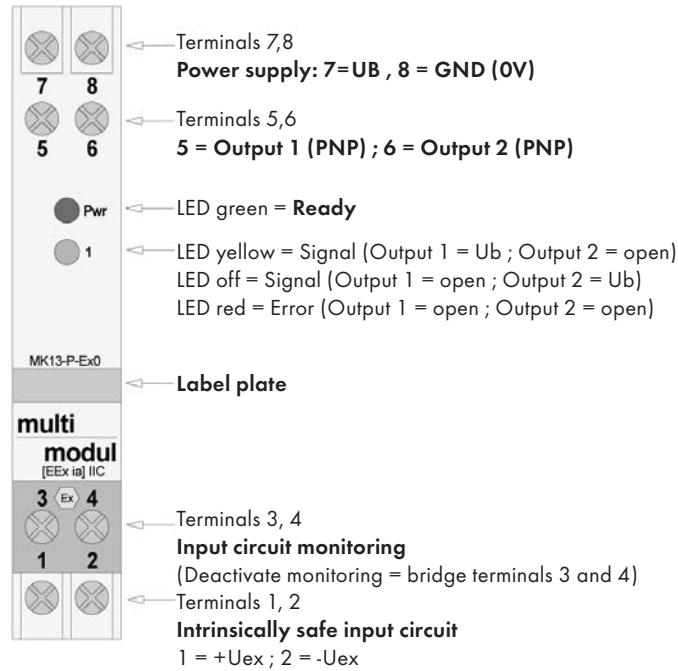


Figure 2: View of the isolation switching amplifier MK 13-P-Ex0/24VDC/K15

The terminals 1... 4 of the isolation switching amplifier marked in blue have electrical circuits in the ignition protection type "Intrinsic Safety" for explosion protection in accordance with EN 50020.

The intrinsically safe circuits are certified by authorized inspection agencies and approved for use in the respective countries.

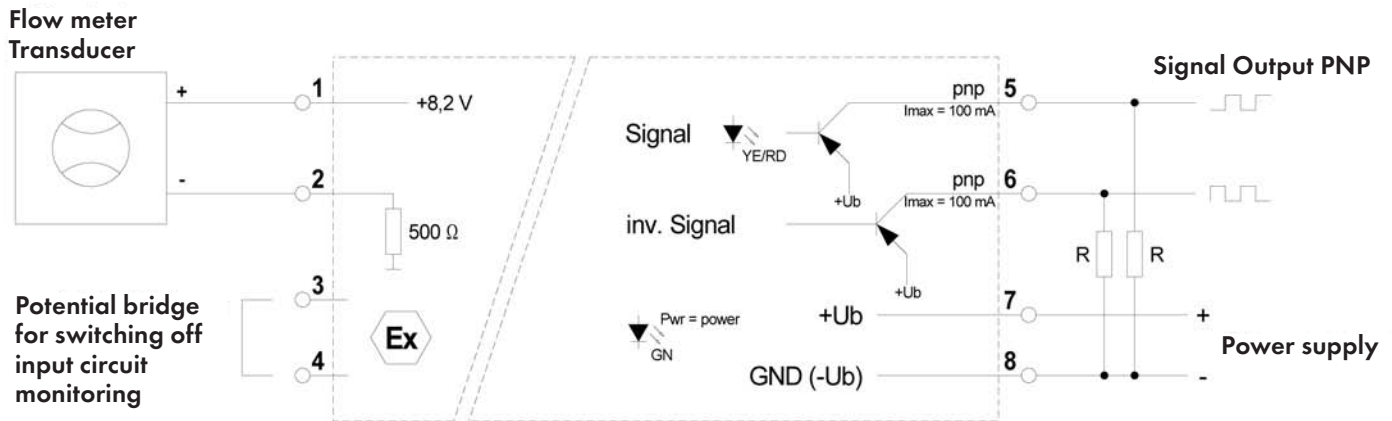


Figure 3: Circuit diagram of the isolation switching amplifier MK 13-P-Ex0/24VDC/K15

The flow meter delivers a digital current signal which is processed further in the isolation switching amplifier.

Low Signal = < 2.7 mA  
High Signal = > 3.7 mA

Since signals are transmitted by means of an imposed current signal, only two wires are needed for the transmission cable. From the current signal, the isolation switching amplifier generates the plus switching output signal (PNP signal) and the inverted plus switching output signal (PNP signal).

Usually the receiver only requires the standard generated signal (see Figure 3 and Figure 4), the inverted signal is processed only in exceptional cases. In the circuit diagrams, therefore, the inverted signal is shown only dashed. Therefore the inverted signal is.

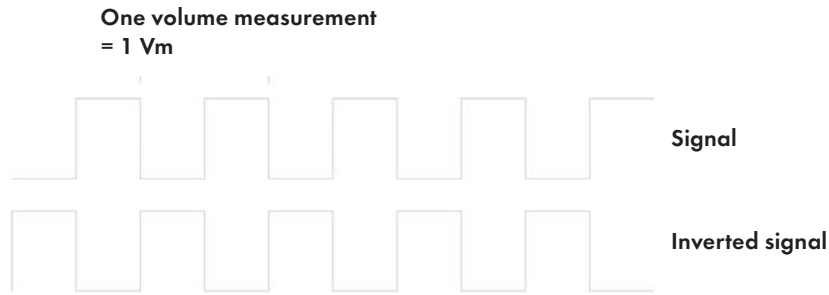


Figure 4: Signal output of the isolation switching amplifier

### Note:

**Please note that the signal output of the isolation switching amplifier is a PNP signal (low signal = open output; high Signal =  $U_b$ ). If the evaluation unit has high-impedance inputs, this could cause problems, especially at higher flow rates. The signal flanks slur and the analysing unit can no longer recognize digital signals. In this case, connect a pull-down resistor of approx. 2.2 ... 4.7 k  $\Omega$  parallel to the input of the evaluation unit (see Figure 3 resistor R).**



If the "wire jumper for input circuit monitoring" (see Figure 3) is switched, the monitoring is disabled.

## • Technical data for isolation switching amplifier MK 13-P-Ex0/24VDC/K15

<b>Manufacturer</b>	Werner Turck GmbH & Co. KG	External inductivity/capacity $L_o/C_o$	2/10/20mH / 5/3.5/3 $\mu$ F
<b>Type Designation</b>	MK13-P-Ex0/24VDC/K15	- [EEx ia] IIB	1/5/10mH / 1.1/0.75/0.65 $\mu$ F
<b>Operating voltage</b>	10 ... 30V DC	- [EEx ia] IIC	-25 ... +70 °C
Ripple WSS	$\leq 10\%$	Designation of the device	II (1) GD [EEx ia] IIC
Power consumption	approx. 20mA	<b>LED displays</b>	
Galvanic isolation	input circuit to input circuit and supply voltage for 250Veff	- Status / error alarm	yellow / red (two-colour LED)
Test voltage	2.5kVeff	- Ready	green
<b>Input circuit</b>	intrinsically safe as per EN 50020	<b>Terminal box</b>	8- pole, polycarbonate / ABS
Rating			Combustibility class V-0 according to UL94 can be snapped onto DIN rail (DIN 50022) or snapped onto subplate
- Open circuit voltage $U_o$	8.2V	Dimensions	Height: 89mm, Length: 70mm, Width: 18mm
- No-load current $I_o$	16.4mA	Connection	Flat terminals with self-lifting pressure disc
- Internal resistance $R_i$	$\leq 500\Omega$	Connection cross-section	$\leq 2 \times 2.5\text{mm}^2$ oder $2 \times 1.5\text{mm}^2$ with wire end sleeves
Switch points	2.9 ... 3.5mA ( $\pm 0.2\text{mA}$ )	Protection class	(IEC 60529 / EN60529) IP20
Discontinuity threshold	$\leq 0.16\text{mA}$	Operating temperature range	-25 ... +70 °C
Short-circuit threshold	$\leq 12.4\text{mA}$		
<b>Output circuits</b>	two transistor outputs, short-circuit-proof, plus switching		
Line voltage drop	$\leq 2.5\text{V}$		
Switching current per output	$\leq 100\text{mA}$		
Switching frequency	$\leq 3\text{kHz}$		
<b>Ex-approval according to conf.- certificate</b>	PTB 06 ATEX 2025		
Maximum values			
- Open circuit voltage $U_o$	$\leq 9.9\text{V}$		
- Short-circuit current $I_o$	$\leq 22\text{mA}$		
- Output $P_o$	$\leq 54\text{mW}$		

## • Installation of VSE flow meters in explosion-prone areas

The following illustrations show three examples of the connection of flow meters intended for use in explosion-prone areas.

Select the example most suitable for your application and connect the individual pieces of equipment according to the illustrations shown. Switching amplifiers also contain circuits which are not intrinsically safe and must **not** be installed in explosion-prone areas. The electrical circuits which are not intrinsically safe are to be installed in accordance with DIN VDE 0100-410.

In explosion-prone areas, the flow meters are connected to a system which has been grounded according to regulations. For safe EMC operation, VSE supplies a connecting cable with the shield bearing on the coupling nut of the four-pole circular plug-in connector.

For safe EMC operation it is not necessary to also connect the shield earth potential at the other end of the connecting wire. You must always make sure that the **potential equalization system** is connected properly to ensure that **no difference in potential** can occur between the connections of the earth conductor PE (flow meter >> switching amplifier >> electron. evaluation). For this purpose, connect an additional wire (ca. Ø 4.. Ø 6 mm<sup>2</sup>) between the individual pieces of equipment (see PE arrows in the following illustrations) or connect the individual PE connecting points radial at a certain point with the earth conductor PE.

Connection can be made to the housing of the measuring device, to which a conductor with a minimum cross-section of 4mm<sup>2</sup> is to be made.

### Important:

**Assembly and installation must always be carried out in compliance with the local valid regulations, the observance of which is the responsibility of the operator of the measuring equipment.**

**All installations must meet the EMC requirements. You must make sure that there is no difference in potential between the individual pieces of equipment and lay a potential equalisation!**



The connection diagram Figure 5 shows the evaluation of a signal from the flow meter. With this measuring system you can determine the flow rate and the volume, but the direction of flow cannot be determined with this circuit.

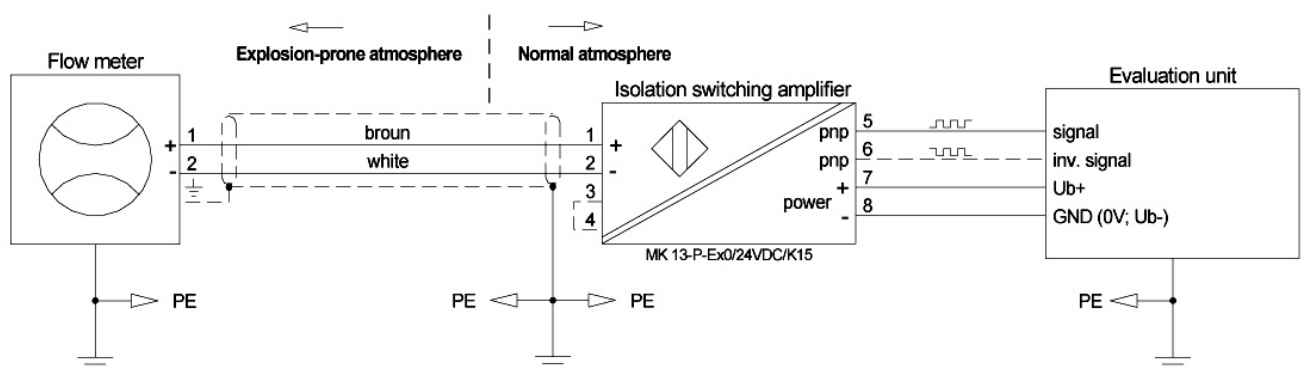


Figure 5: Evaluation of one channel

### Important:

**This evaluation unit can be used when it is ensured that the volume flow can flow in only one direction. When the flow direction changes (also short term), the receiver does not perceive this return flow, and a measurement error occurs.**



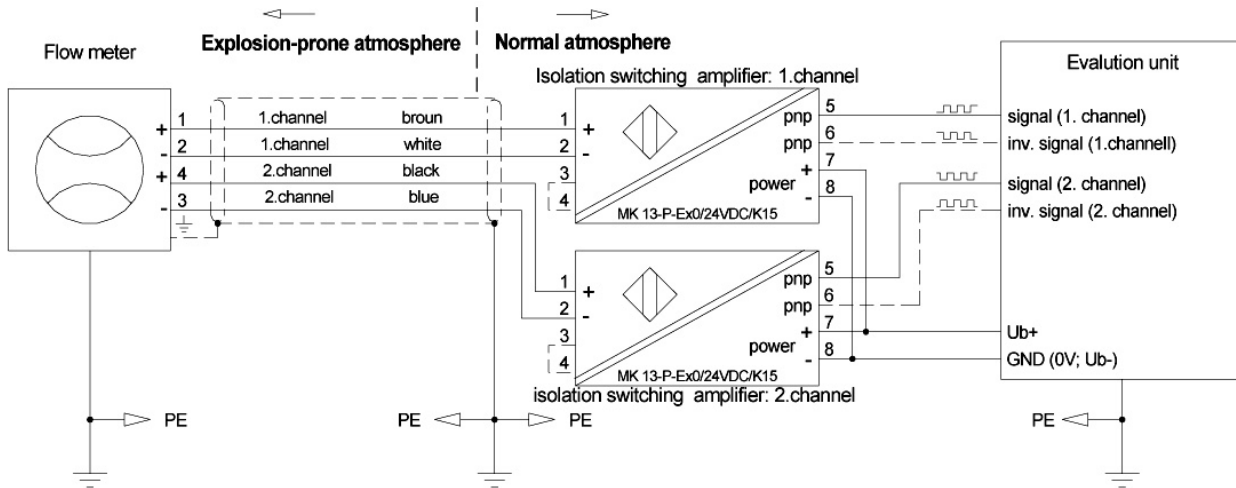


Figure 6: Evaluation of two channels (standard circuit)

As a rule, this circuit is used as the standard. The electronic evaluation unit processes the digital signals from channels 1 and 2 and supplies the current. The inverted signals of the channels are not required for the evaluation so that they are omitted, and you only need a four-strand cable.

With the Figure 7 circuit, you can create two autarchic functioning signal systems. This type of flow meter has two galvanic isolated circuits which

operate separately, thus allowing a separate processing of the signals (channel 1 and channel 2). As you can see in Figure 7, the signals are transmitted through isolation switching amplifiers which operate separately. The two systems are fed by two sources of power. Since the two signal systems are galvanically isolated from one another and operate independently, this type is used in equipment and systems which operate redundantly. Even if one of the signal systems fails, the other continues to function.

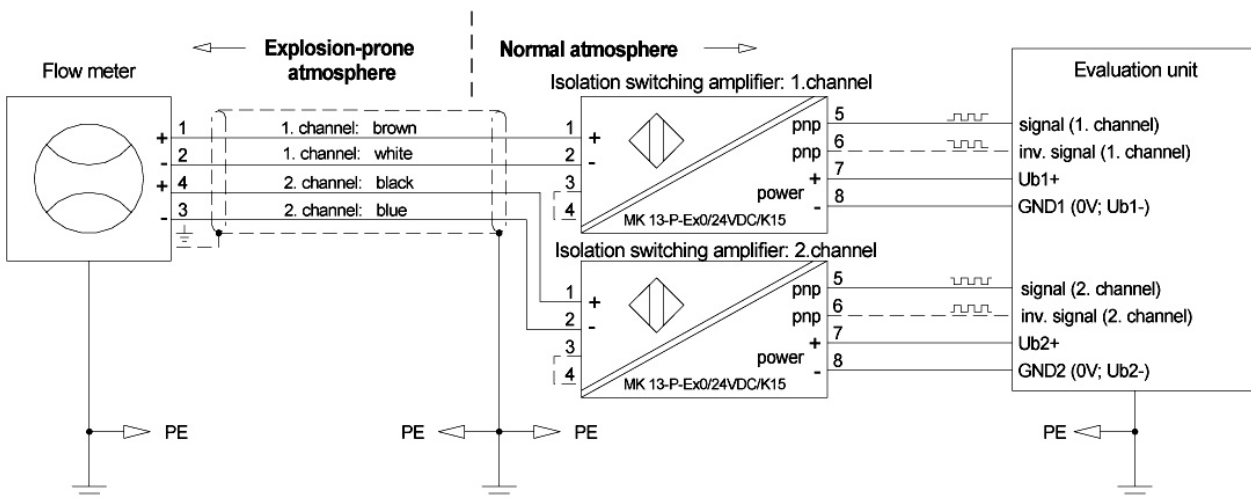


Figure 7: Galvanic isolation between the channels through separate power supply

## Important:

The isolation switching amplifier MK13-P-Ex0/24VDC/K15 is manufactured by the **WERNER TURCK GmbH & Co. KG** exclusively for the Ex-type flow meters of the **VSE Volumentechnik GmbH!**



The connection diagram in Figure 6 shows the evaluation of two channels of the flow meter. With this measuring system, you can measure the flow rate and volume in both directions of flow.

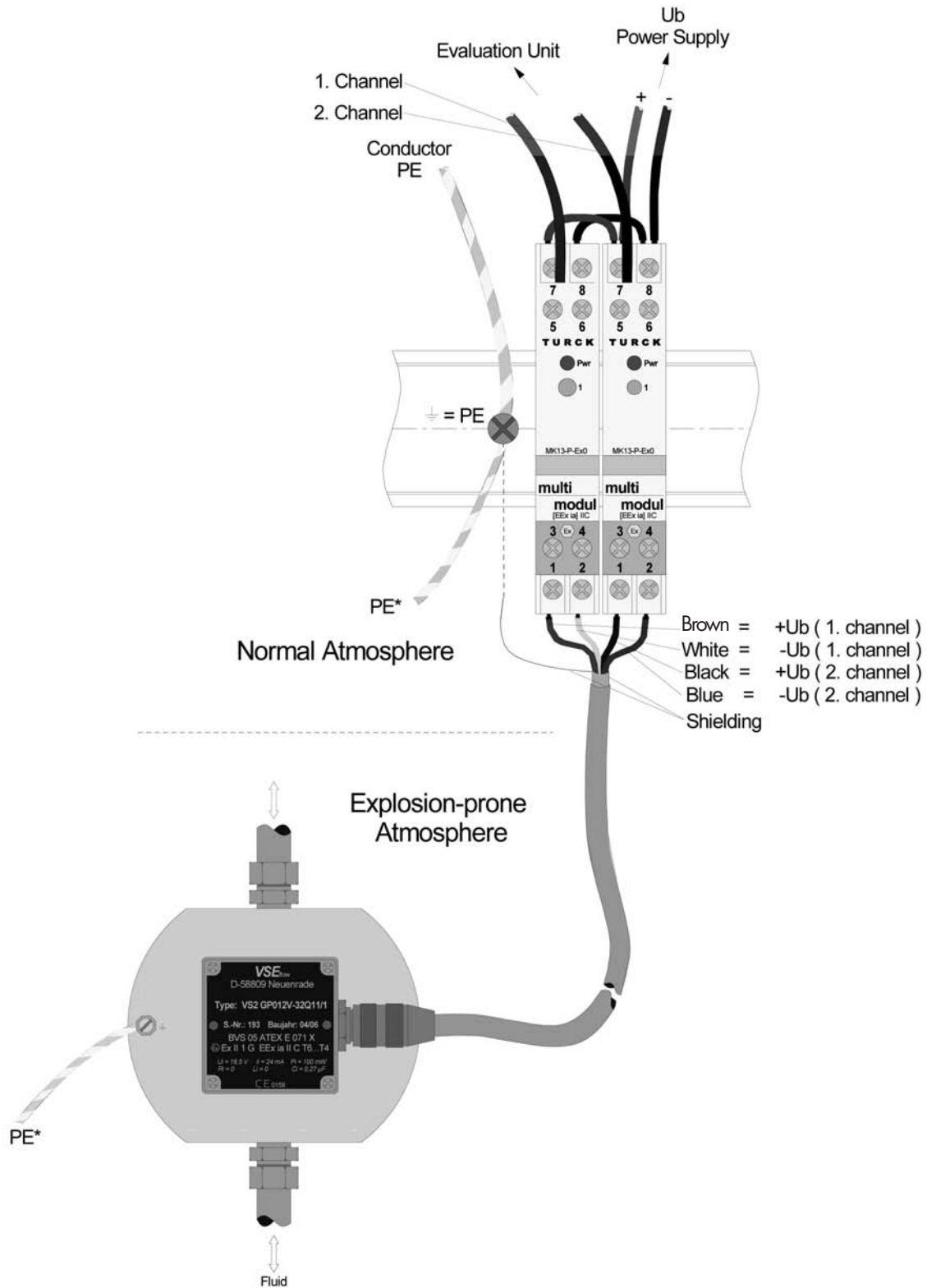


Figure 8: Measurement in explosive areas

**Important:**

**Persons who are assigned to assemble, put into service and operate the devices must be correspondingly qualified for the tasks and, in particular, be knowledgeable about explosion protection.**



## • Safety information for installation and initial start-up in explosion-prone areas

- The set-up of Ex-systems is to be carried out strictly by qualified personnel only, i.e. by an authorized person with explosion protection training!
- The qualified personnel must have observed and understood the corresponding EC-type examination certificates and EC declarations of conformity!
- Work on the devices is to be carried out strictly in a dead voltage state!
- Before the initial start up of the flow meters, the entire system must be carefully flushed and cleaned so that no extraneous material left over from the installation can get into the flow meter!
- The pipelines and the flow meter must always be filled during operation so that no gas bubbles can form!
- Heavily contaminated fluid or extraneous material in the fluid can block, damage or even destroy the flow meter. In such cases, always install a sufficiently rated filter in front of the flow meter to prevent damage to the flow meter!
- VSE ex-type flow meters are **not** approved for areas prone to dust explosions!
- In order to suppress inductive interference, a connecting cable with the shield bearing on the coupling nut of the four-pole circular plug-in connector must be used during the installation of the flow meter. In explosion-prone areas the flow meter is connected to the ground potential. The greatest care must be taken to ensure that between each end of the electrical circuit (i.e. between the explosive area and the non-explosive area) potential equalisation exists. The potential equalisation of the ground conductor PE must be present wherever the intrinsically safe electrical circuit is created!
- The operator must keep the system in proper condition, operate it, constantly monitor it, and carry out necessary repair work on it immediately while taking the required safety measures. This process known as constant monitoring should be adopted in conformance with European legislation!
- For the use of flow meters of the „VS“ production series in explosion-prone areas, VSE supplies specialised flow meters. These flow meters are approved for use in explosive areas and must always be operated with isolation switching amplifiers which guarantee the intrinsic safety and are Ex-certified. They are marked in blue and offer the necessary explosion protection safety!
- The isolation switching amplifiers must ensure that the intrinsic safety of the signal current is at the „ia“ (DIN EN 50020) protective level and their limiting values must not exceed the maximum approved input values of the flow meter!
- After connecting an intrinsically safe circuit to a circuit which is not intrinsically safe circuit even just once, the use as equipment with an intrinsically safe circuit it is no longer permitted. This applies to the isolation switching amplifier as well as to the flow meter. Corresponding regulations exist for the set-up of intrinsically safe circuits, the attachment of external connecting parts and for the properties and laying of the wires. Wires and terminals with intrinsically safe circuits are to be marked and separated reliably from circuits which are not intrinsically safe (EN 60079-14)!
- The sum of the maximum effective capacity  $C_i$  and inductance  $L_i$  of the flow meter and the four-pole connecting cable must not exceed the maximum values  $C_0$  and  $L_0$  of the associated switching amplifier. Pay attention also to the manufacturer's instructions for the connecting cable and the length of wire used!
- Whenever the flow meters are in operation, the approved ambient and media temperatures in the corresponding temperature classes must not be exceeded!
- When starting up or performing repairs on the flow meter, the housing must be well protected against bumps and sharp edges, tools or other such situations!
- The pre-amplifier housing is made of die cast aluminium. Bumping and rubbing, especially between aluminium and steel, must be avoided so that no sparks are generated!
- When using the flow meter (VS Ex-type) in areas which require category 1 equipment, the sensor must be set up so that sparks from bumping and rubbing eliminated!
- No changes or expansions may be made to the devices if not explicitly allowed by the manufacturer. If the housing of the pre-amplifier is opened, the explosion protection is cancelled!



- **Maintenance and repairs**

**VSE flow meters are basically maintenance-free. Nevertheless it's advisable to return the flow meters to the factory for regular inspections, especially when they are used in extreme situations or with critical media (e.g. abrasive, soiled media or media with fillers or pigments), high viscosity and very high loads on the meter (e.g. frequent and rapidly changing flows). At the factory, any minor damage can be detected and repaired at an early stage before it leads to a complete failure of the flow meter, whether due to a defective bearing or due to a blocking of the meter.**

**The operator is responsible for regular checks, maintenance and recalibration. Any observed defect or damage prohibits the further use!**

**Repairs are to be made by the manufacturer or authorized personnel only. Any other repairs must be examined by a specialist.**



- **Return of repairs and sample devices**

It is imperative that you enclose an exact description of the complaint, objection or fault when returning the device to ensure a rapid and economic repair of the flow meters and other components. Furthermore, you must include a material safety data sheet (MSDS), which informs unambiguously which fluid was run with the flow meter and how dangerous this fluid is.

The maintenance of legal regulations as regards work safety, such as workplace regulations, accident prevention regulations, and stipulations on environmental protection, waste disposal and the water management law, obliges industrial corporations to protect their employees and other persons and environment against harmful effects when handling hazardous

materials. If further safety precautions are still necessary despite careful emptying and cleaning of the flow meter, information on this is imperative and must be included with the returned despatch.

When returning flow meters to VSE Volumentchnik GmbH, please note that inspection and repair will only be performed if the **safety specifications sheet** of the utilised medium is enclosed and the flow meters completely cleaned and flushed. This protects our employees and simplifies our work.

**Non-compliance will result in a return at your expense!**



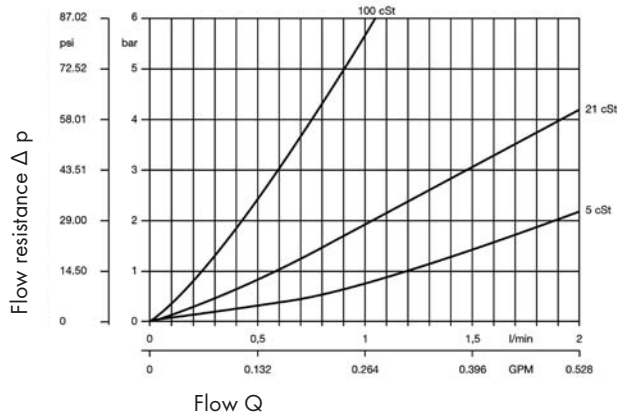
**• Technische Daten VS0.02 – VS4**

Size	Measuring range l/min	Frequency Hz	Pulse value cm <sup>3</sup> /pulse	K-factor pulse/litre
VS 0.02	0.002 ... 2	1.667 ... 1666.67	0.02	50 000
VS 0.04	0.004 ... 4	1.667 ... 1666.67	0.04	25 000
VS 0.1	0.01 ... 10	1.667 ... 1666.67	0.1	10 000
VS 0.2	0.02 ... 18	1.667 ... 1500.00	0.2	5 000
VS 0.4	0.03 ... 40	1.250 ... 1666.67	0.4	2 500
VS 1	0.05 ... 80	0.833 ... 1333.33	1	1 000
VS 2	0.1 ... 120	0.833 ... 1000.00	2	500
VS 4	1.0 ... 250	4.167 ... 1041.67	4	250

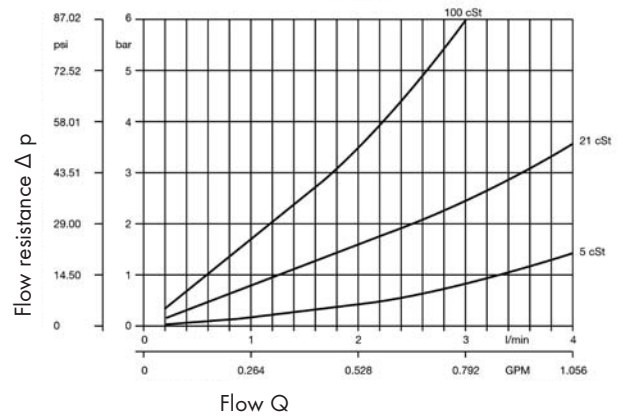
<b>Accuracy</b>	: up to 0.3 % of measurement value (with viscosity > 20mm <sup>2</sup> /s)	
<b>Repeatability</b>	: ± 0.05 % under the same operating conditions	
<b>Material</b>	: Cast iron EN-GJS-400-15 (EN 1563) or stainless steel 1.4305	
<b>Meter bearing</b>	: Ball bearings or steel plain bearings (medium-dependent)	
<b>Seals</b>	: FPM (standard), NBR, PTFE or EPDM	
<b>Max. operating pressure</b>	: Cast iron EN-GJS-400-15 (EN 1563)	315 bar / 4568 psi
	: stainless steel 1.4305	450 bar / 6526 psi
<b>Viscosity range</b>	: 1 ... 100 000 mm <sup>2</sup> /s	
<b>Installation position</b>	: unrestricted	
<b>Flow direction</b>	: unrestricted	
<b>Running noise</b>	: max. 72 db(A)	
<b>Channel offset</b>	: 90° ± 30° max.	
<b>Pulse-width repetition rate</b>	: 1/1 ± 15° max.	
<b>Pre-amplifier housing</b>	: Aluminum	
<b>Protection type</b>	: IP 65	

• Flow response curves VS 0.02 – VS 4

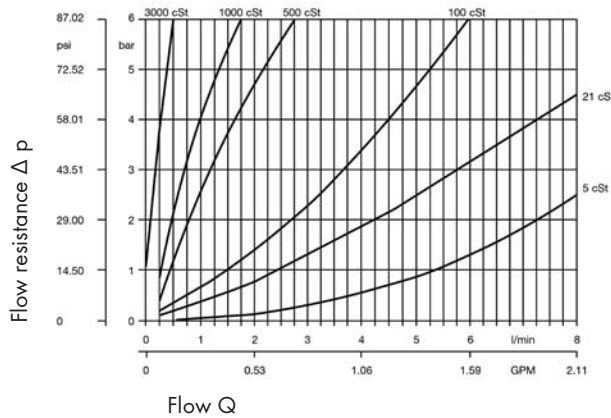
**VS 0.02**



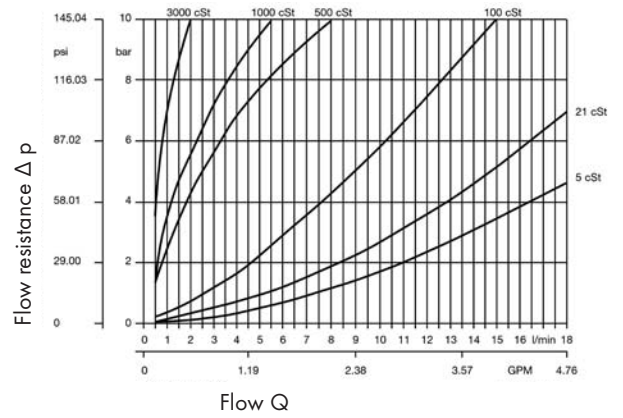
**VS 0.04**



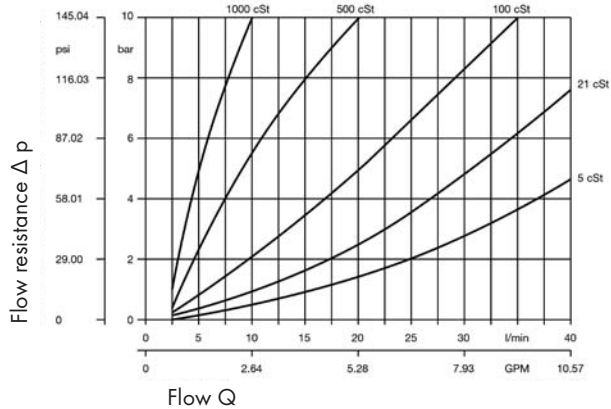
**VS 0.1**



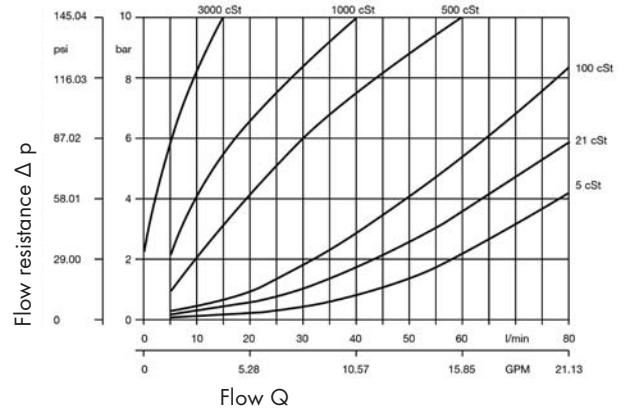
**VS 0.2**



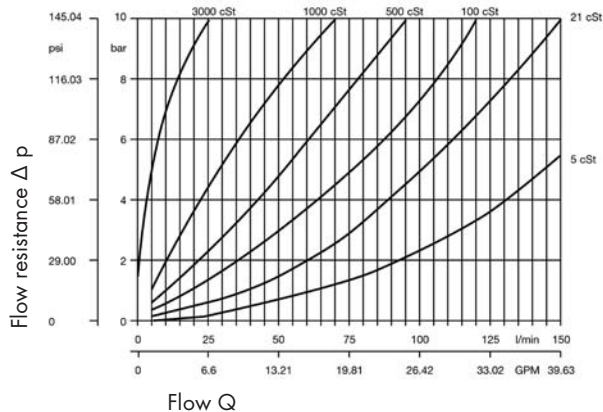
**VS 0.4**



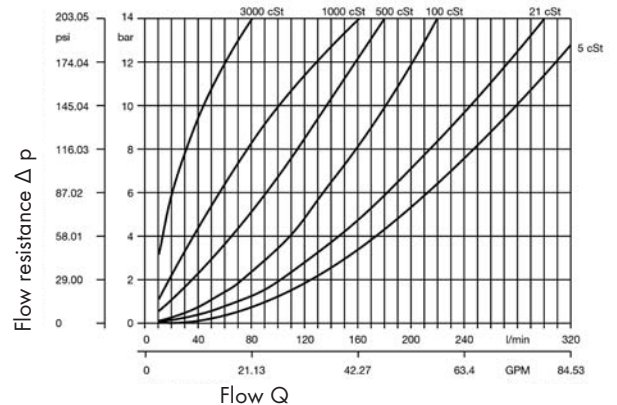
**VS 1**



**VS 2**

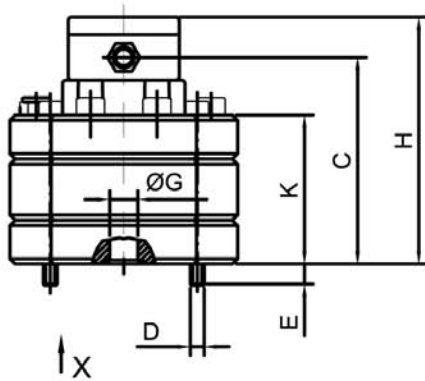


**VS 4**



• **Dimensions VS 0.02 – VS 4**

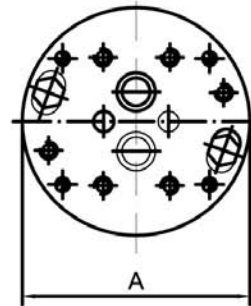
Cast iron version



View X

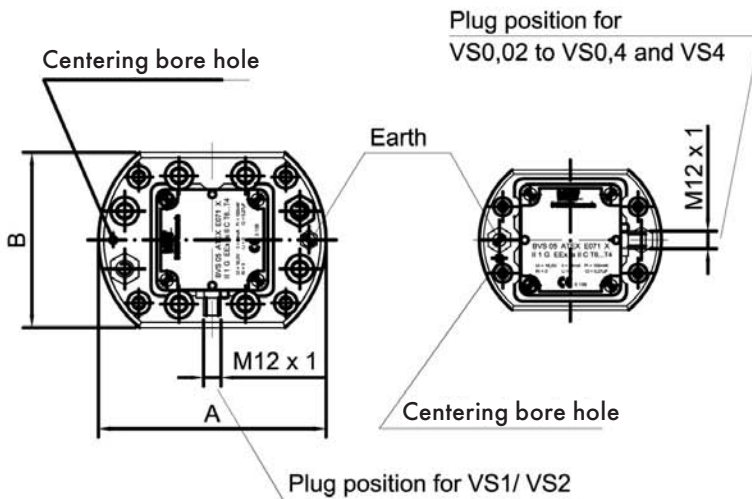
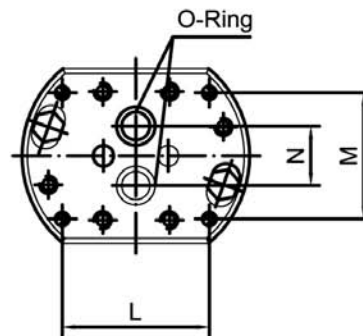
Stainless steel version  
Connection diagram

Housing without milled edge



View X

Cast iron version  
Connection diagram

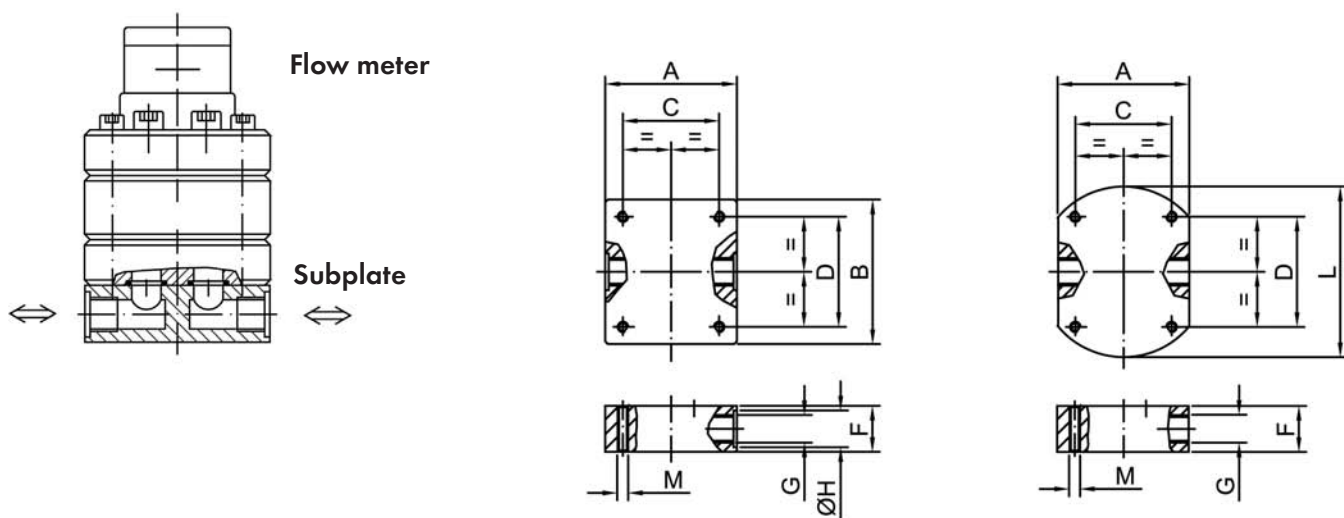


size	A	B	C	D	E	øG	H	K	L	M	N	O-ring	weight GCI	E
VS													kg	kg
0.02	100	80	91	M6	12.5	9	114	58	70	40	20	11 x 2	2.8	3.4
0.04	100	80	92	M6	11.5	9	115	59	70	40	20	11 x 2	2.8	3.4
0.1	100	80	94	M6	9	9	117	61	70	40	20	11 x 2	2.8	3.4
0.2	100	80	94	M6	9.5	9	117	61	70	40	20	11 x 2	3.0	3.7
0.4	115	90	96.5	M8	11.5	16	120	63.5	80	38	34	17.96 x 2.62	4.0	5.0
1	130	100	101	M8	12.5	16	124	68	84	72	34	17.96 x 2.62	5.3	6.8
2	130	100	118	M8	15	16	141	85	84	72	34	17.96 x 2.62	6.7	8.4
4	180	140	145	M12	20	30	168	110	46	95	45	36.17 x 2.62	14.7	18.4

The dimensions are specified in mm

• **Dimensions, subplates AP.02 - 4**

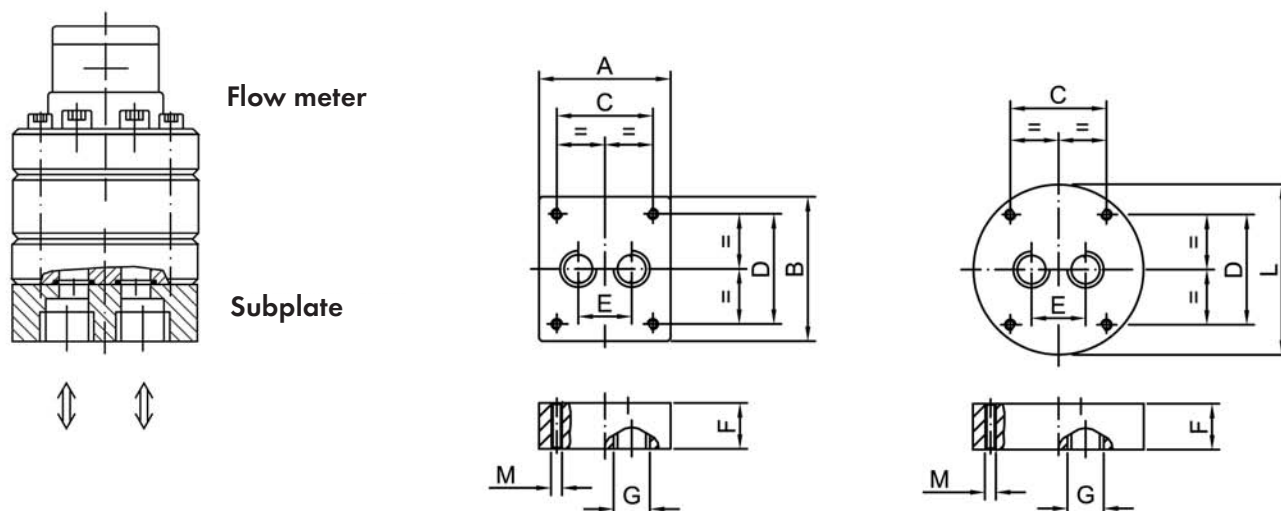
Connection position, side



For size VS	Connection thread G	F	øH	A	B	C	D	E	L	Thread /depth M	weight kg
0.02	G 1/4"	35	20	80	90	40	70	26	100	M6 / 12	1.8
0.04	G 3/8"		23					30			
0.1	G 1/2"		28					38			
0.2											
0.4	G 1/2"	35	28	90	100	38	80	46	115	M8 /15	2.7
	G 3/4"	40	33					52			
1 2	G 1/2"	35	28	100	110	72	84	46	130	M8 /15	3.6
	G 3/4"	40	33					52			
	G 1"	55	41					55			
4	G 1 1/4"	70	51	120	130	100	110	60	M8 /15	7.4	
	*G 1 1/2"	70	56				120				
	G 1 1/2"	80		140			110	72		180	12.0

\*only for AP. 4 U...

Connection position below

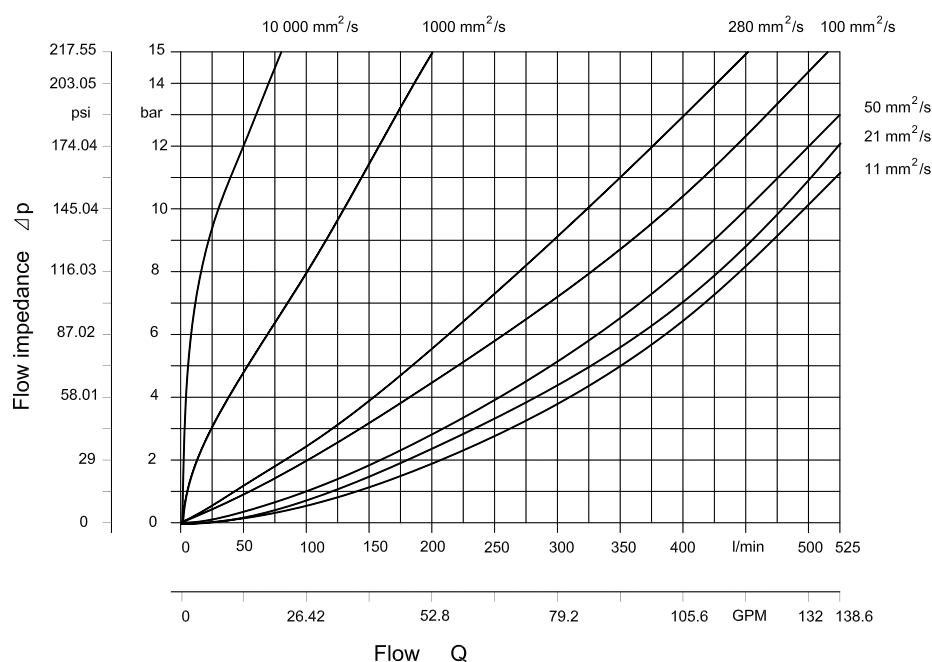


## • Technical specifications VS 10

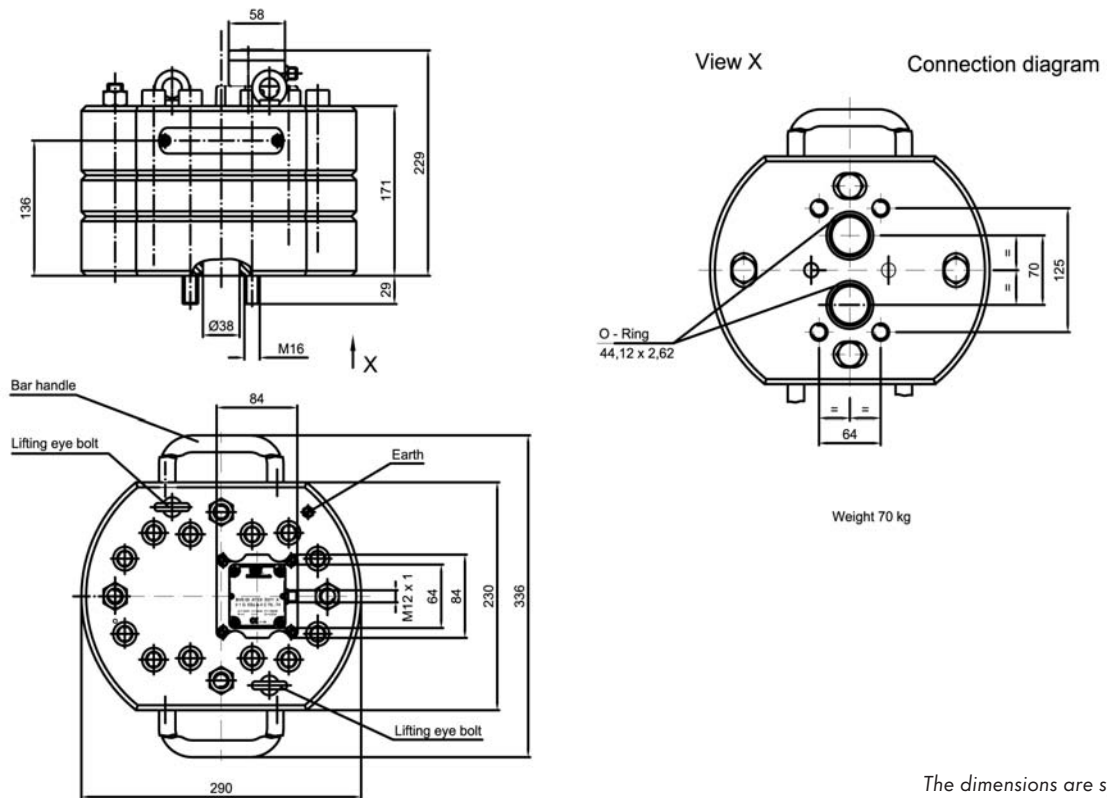
Size	Measuring range l/min	Frequency Hz	Pulse value cm <sup>3</sup> /pulse	R-factor pulse/litre
VS 10	1.5 ... 525	7.50 ... 2625.00	3.333	300

Accuracy	: up to 0.3 % of measurement value (with viscosity > 20mm <sup>2</sup> /s)
Repeatability	: ± 0.05 % under the same operating conditions
Material	: Cast iron EN-GJS-600-3 (EN 1563)
Meter bearing	: Ball bearings or steel plain bearings (medium-dependent)
Weight	: 70 kg without connection plate
Seals	: FPM (standard), NBR, PTFE or EPDM
Max. operating pressure	: 350 bar / 5000psi
Viscosity range	: 5 .....100 000 mm <sup>2</sup> /s
Installation position	: unrestricted
Flow direction	: unrestricted
Running noise	: <80 db(A)
Channel offset	: 90° ± 30° max.
Pulse-width repetition rate	: 1/1 ± 15° max.
Pre-amplifier housing	: Aluminum
Protection type	: IP 65

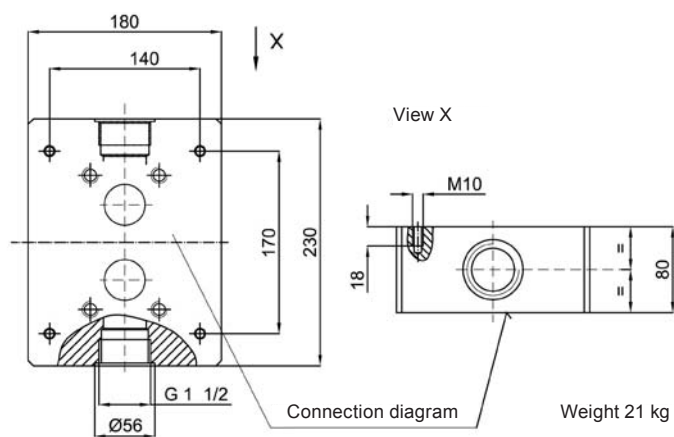
## • Flow response curves VS 10



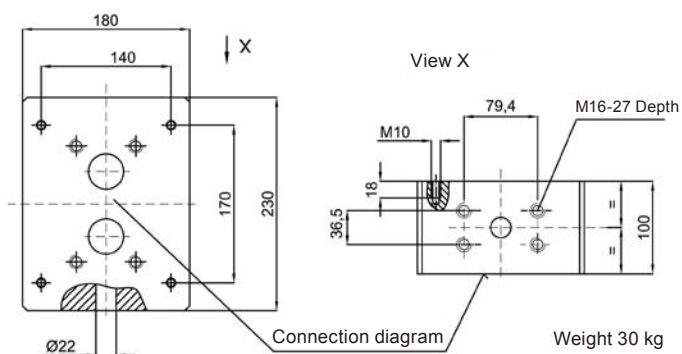
• **Dimensions VS 10**



• **Dimensions, subplate APG 10**  
APG 10 SG0N / 1



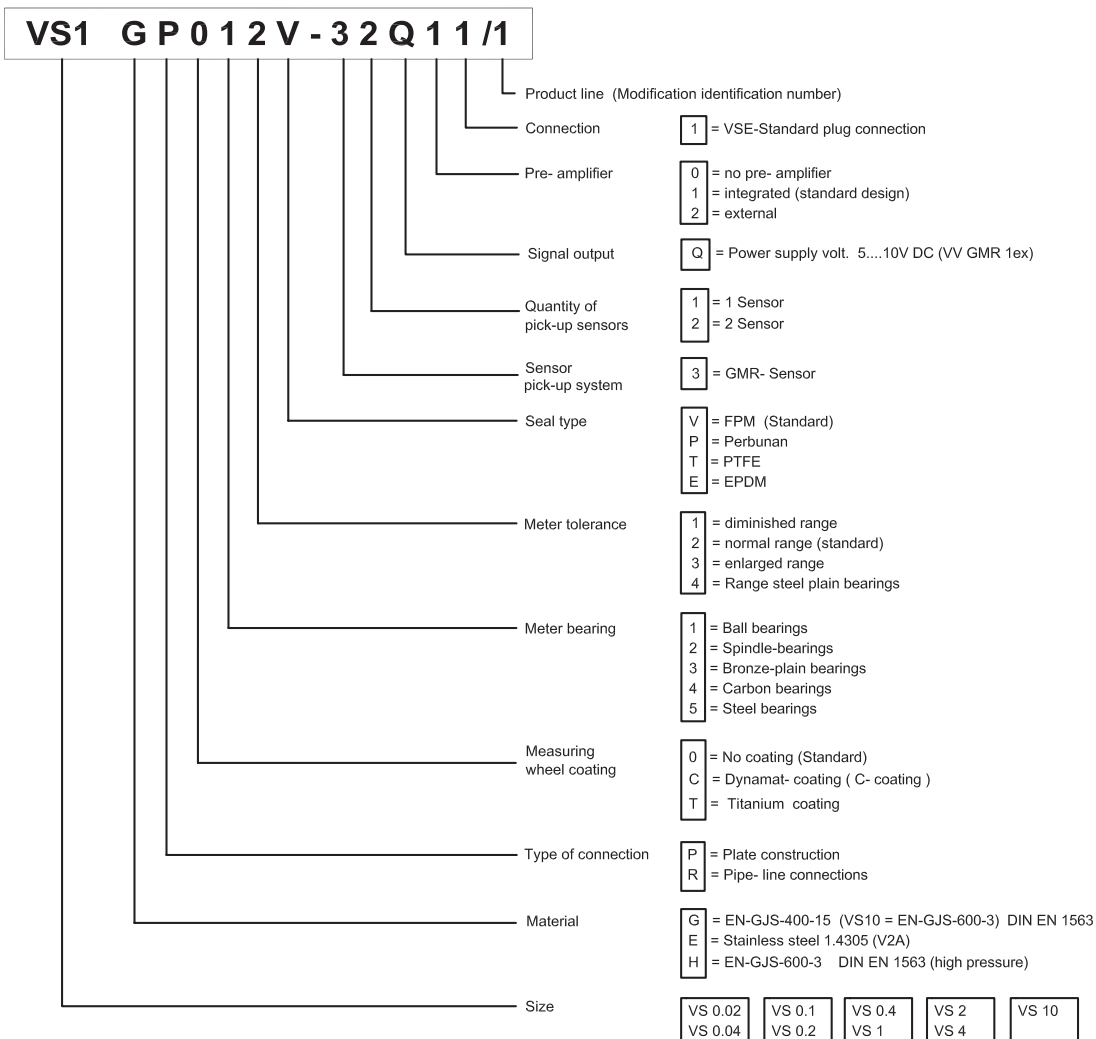
APG 10 SW0N / 1



## • Type key

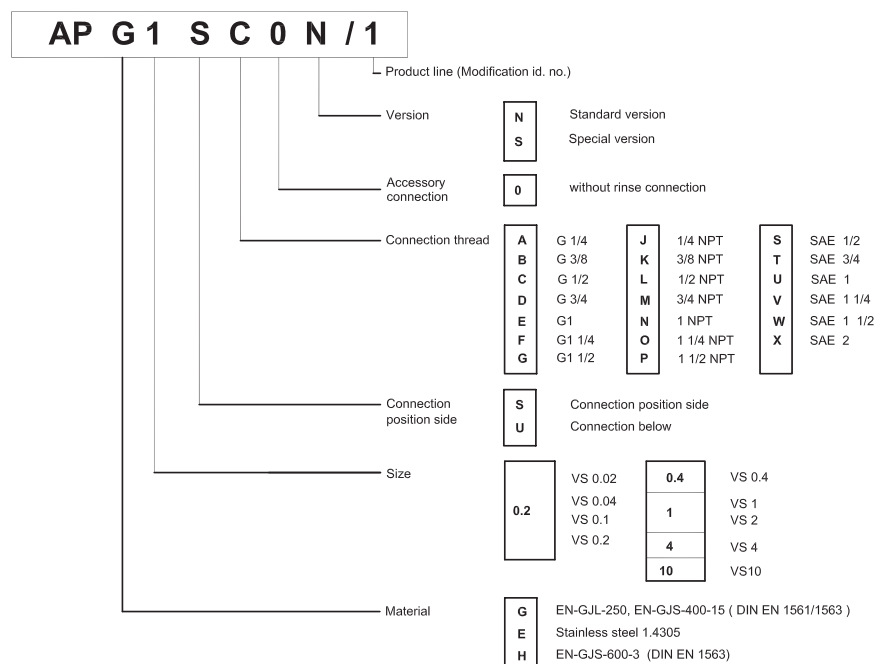
### Flow meters VS Ex-type

Example :



## Subplates AP

Example :



• **Labelling of the flow meter**

Name and address of the manufacturer:

VSE Volutentechnik GmbH  
Hönnestraße 47  
58809 Neuenrade / Germany

CE label:



Type designation :

VS \*\*\* \*-32Q1 \*/\*

Compliance with directive 94/9/EC compliance



II 1G EEx ia IIC T6...T4

Type plate:



• **Safety data for flow meter type VS \*\*\* \*-32Q1 \*/\***

**Nominal values:**

Nominal voltage  $V_{CC1,2} = 5...10V$   
Switching current  $I_{Low1,2} < 2.7mA$  ( $I_{Low min1,2} > 2.0mA$ )  
 $I_{High1,2} > 3.7mA$  ( $I_{high max1,2} < 4.5mA$ )

**Maximum values**

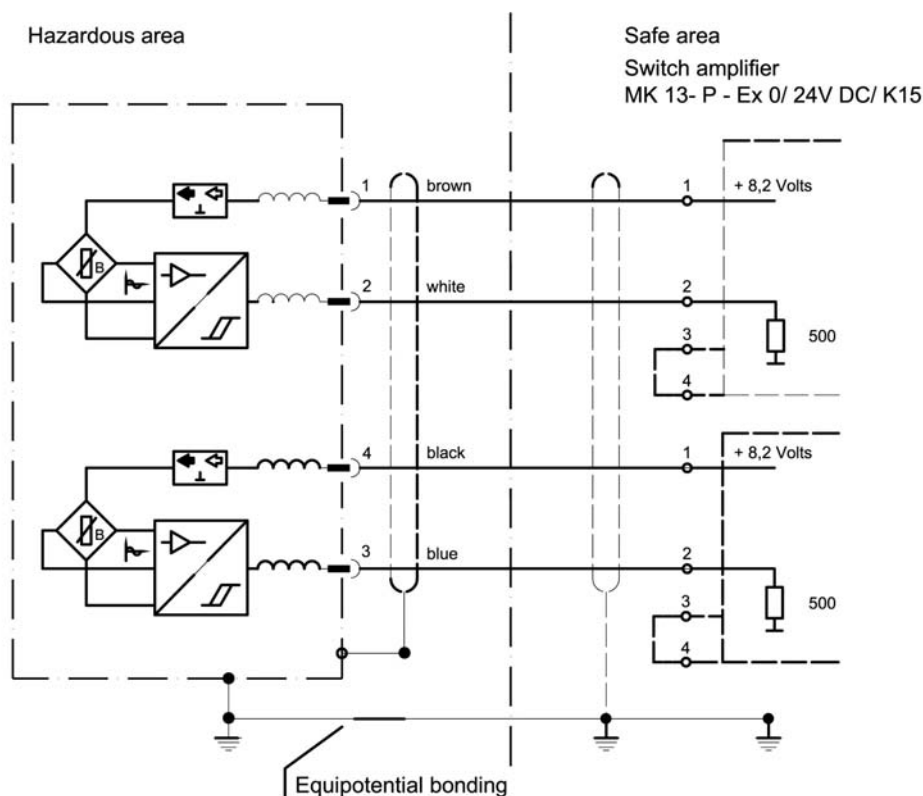
$U_i = 18.5V$   
 $I_i = 24 mA$   
 $P_i = 100mW$   
 $C_i = 0.27\mu F$   
 $L_i = 0$   
 $R_i = 0$

• **Maximum ambient and media temperatures**



Temperature class	T4	T5	T6
Ambient temperature	$-20^{\circ}C (-4^{\circ}F) \leq T_{amb} \leq 95^{\circ}C (203^{\circ}F)$	$-20^{\circ}C (-4^{\circ}F) \leq T_{amb} \leq 70^{\circ}C (158^{\circ}F)$	$-20^{\circ}C (-4^{\circ}F) \leq T_{amb} \leq 55^{\circ}C (131^{\circ}F)$
Media temperature	$-20^{\circ}C (-4^{\circ}F) \leq T_{Med} \leq 100^{\circ}C (212^{\circ}F)$	$-20^{\circ}C (-4^{\circ}F) \leq T_{Med} \leq 75^{\circ}C (167^{\circ}F)$	$-20^{\circ}C (-4^{\circ}F) \leq T_{Med} \leq 60^{\circ}C (140^{\circ}F)$



• Pre-amplifier - block wiring diagram



• Summary of the safety-related technical data

Flow meter	VSE connecting cable, blue RAL 5015	Switching amplifier																					
Type: VS *** *****-32Q1*/*	shielded; 4x 0.34 mm <sup>2</sup>	Type: MK13-P-Ex0/24VDC/K15																					
BVS 05 ATEX E 071 X	PUR	PTB 06ATEX 2025																					
 II 1G EEx ia IIC T4-T6		 II (1) G [EEx ia] IIC																					
U <sub>i</sub> = 18.5 V	R = 0.053 Ω/m	U <sub>o</sub> = 9.9 V																					
I <sub>i</sub> = 24 mA	L = 0.85 µH/m (x)	I <sub>o</sub> = 22 mA																					
P <sub>i</sub> = 100 mW	C <sub>A-A</sub> = 55 pF/m (x)	P <sub>o</sub> = 54 mW																					
R <sub>i</sub> = 0	C <sub>A-S</sub> = 105 pF/m (x)																						
L <sub>i</sub> = 0	[(x) = measured at 1000Hz]																						
C <sub>i</sub> = 0.27 µF																							
		<table><tr><td></td><td colspan="3">IIC</td><td colspan="3">IIB</td></tr><tr><td>Lo/mH</td><td>1</td><td>5</td><td>10</td><td>2</td><td>10</td><td>20</td></tr><tr><td>Co/µF</td><td>1.1</td><td>0.75</td><td>0.65</td><td>5</td><td>3.5</td><td>3</td></tr></table>		IIC			IIB			Lo/mH	1	5	10	2	10	20	Co/µF	1.1	0.75	0.65	5	3.5	3
	IIC			IIB																			
Lo/mH	1	5	10	2	10	20																	
Co/µF	1.1	0.75	0.65	5	3.5	3																	


Temperature class	T4	T5	T6
Ambient temperature	-20°C (-4°F) ≤ T <sub>amb</sub> ≤ 95°C (203°F)	-20°C (-4°F) ≤ T <sub>amb</sub> ≤ 70°C (158°F)	-20°C (-4°F) ≤ T <sub>amb</sub> ≤ 55°C (131°F)
Media temperature	-20°C (-4°F) ≤ T <sub>Med</sub> ≤ 100°C (212°F)	-20°C (-4°F) ≤ T <sub>Med</sub> ≤ 75°C (167°F)	-20°C (-4°F) ≤ T <sub>Med</sub> ≤ 60°C (140°F)



Translation

**EC-Type Examination Certificate**

- (1)
- (2) **- Directive 94/9/EC -**  
**Equipment and protective systems intended for use**  
**in potentially explosive atmospheres**
- (3) **BVS 05 ATEX E 071 X**
- (4) **Equipment:** Volume sensor type VS \*\*\* \*\*\*\*\*-32Q1\*/\*\*and Typ EF \*\*\* Q\*\*\*\*\*\_\*/\*\*
- (5) **Manufacturer:** VSE Volumentechnik GmbH
- (6) **Address:** 58809 Neuenrade, Germany
- (7) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.
- (8) The certification body of EXAM BBG Prüf- und Zertifizier GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.  
The examination and test results are recorded in the test and assessment report BVS PP 05.2049 EG.
- (9) The Essential Health and Safety Requirements are assured by compliance with:  
EN 50014:1997+A1-A2 General requirements  
EN 50020:2002 Intrinsic safety 'i'  
EN 50284:1999 Equipment Group II Category 1G
- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
- (11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC.  
Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate
- (12) The marking of the equipment shall include the following:

 **II 1G EEx ia IIC T4 – T6**

**EXAM BBG Prüf- und Zertifizier GmbH**

Bochum, dated 11. May 2005

Signed: Dr. Jockers

Certification body

Signed: Dr. Eickhoff

Special services unit

Page 1 of 3 to BVS 05 ATEX E 071 X

This certificate may only be reproduced in its entirety and without change  
Dinnendahlstrasse 9 44809 Bochum Germany Phone +49 234/3696-105 Fax +49 234/3696-110



(13) Appendix to

(14) **EC-Type Examination Certificate**

**BVS 05 ATEX E 071 X**

(15) 15.1 Subject and type

Volume sensor type VS \*\*\* \*-32Q1\*/\* and type EF \*\*\* Q\*\*\*\*\*-\*/\*

Instead of the \*\*\* in the complete denomination letters and numerals will be inserted, which characterize modifications without influence on explosion protection.

15.2 Description

The volume sensor is used for measurement of flow or mass flow of liquids.

The electrical components of the sensor are mounted inside an aluminium (EF \*\*\* Q\*\*\*\*\*-\*/\*) or a cast iron or stainless steel enclosure (Typ VS \*\*\* \*-32Q1\*/\*).

The electrical connection is done by a connector.

15.3 Parameters

each channel

Voltage	Ui	DC	18,5	V
Current	Ii		24	mA
Power	Pi		100	mW
Effective internal capacitance	Ci		0,27	µF
Effective internal inductance	Li		negligible	

The temperature class will be defined depending on the ambient temperature range and the medium temperature in accordance with the following table:

Temperature class	T4	T5	T6
Ambient temperature range	-20 °C up to 95 °C	-20 °C up to 70 °C	-20 °C up to 55 °C
max. medium temperature	100 °C	75 °C	60 °C

(16) Test and assessment report

BVS PP 05.2049 EG as of 11.05.2005

(17) Special conditions for safe use

The use of volume sensors type EF \*\*\* Q\*\*\*\*\*-\*/\* in areas, where Category 1-equipment is necessary, the sensor has to be mounted in such a way that sparks by operational friction or impact are not possible.





**Translation**

**1st Supplement**

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

**to the EC-Type Examination Certificate  
BVS 05 ATEX E 071 X**


**Equipment:** Volume sensor type VS \*\*\* -32Q1\*\* and type EF \*\*\* Q\*\*\*\*\*/\*\*  
**Manufacturer:** VSE Volumenteknik GmbH  
**Address:** 58809 Neuenrade, Germany

Description

The sensor can be modified according to the descriptive documents as mentioned in the pertinent test and assessment report.

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:  
EN 50014:1997+A1-A2 General requirements  
EN 50020:2002 Intrinsic safety 'i'  
EN 50284:1999 Equipment Group II Category 1G

The marking of the equipment shall include the following:

 II 1G EEx ia IIC T4 – T6

Special conditions for safe use

The use of volume sensors type EF \*\*\* Q\*\*\*\*\*/\*\* in areas, where Category 1-equipment is necessary, the sensor has to be mounted in such a way that sparks by operational friction or impact are not possible.

Test and assessment report

BVS PP 05.2049 EG as of 31.05.2006

**EXAM BBG Prüf- und Zertifizier GmbH**

Bochum, dated 31. May 2006

Signed: Dr. Jockers

Certification body

Signed: Dr. Eickhoff

Special services unit

**EG-Konformitätserklärung  
EC-Declaration of Conformity  
CE-Déclaration de Conformité**

Wir,  
We,  
Nous,

**VSE Volumentchnik GmbH, Hönnestraße 47, 58809 Neuenrade/Germany**

erklären in alleiniger Verantwortung, dass die Produkte „Volumensensor“ mit der Typenbezeichnung:  
hereby declare in our sole responsibility, that the product "volumetric sensor" with the type codes:  
déclarons de notre responsabilité, que le produit capteur volumétrique type:

**VS \*\*\* \*\*\*\*\*-32Q1\*/\***

Anstelle der Sterne sind Buchstaben und Ziffern eingesetzt, die den Volumensensor kennzeichnen, welche aber keinen Einfluss auf die EMV und den Explosionsschutz haben.

Instead of stars there are insert letters and numbers, which marked the flow-meter but have no influence about the EMC and the explosion prevention.

Des lettres et des chiffres, symbolisant le capteur volumétrique, sont à mettre en lieu et place des astérisques.  
Ils n'ont aucune influence sur l'EMV et la protection contre l'explosion.

auf die sich diese Erklärung bezieht, mit den folgenden Normen oder normativen Dokumenten übereinstimmt.  
which is the subject of this declaration, is in conformity with the following standard or normative documents.  
auquel cette declaration se rapporte, est conforme aux norme ou aux documents normatifs suivants.

Bestimmungen der Richtlinien Terms of the directive Prescription de la directive	Norm Standard Norme
94/9/EG: Geräte und Schutzsysteme zur bestimmungsmäßigen Verwendung in explosionsgefährdeten Bereichen. 94/9/EC: Equipment and protective systems intended for use in potentially explosive atmospheres 94/9/CE: Appareils et systèmes de protection destinés à être utilisés en atmosphères explosibles	EN 50014:1997+A1+A2 EN 50020:2002 EN 50284:1999 EN 60079-14:1997
89/336 EWG: Elektromagnetische Verträglichkeit 89/336 EEC: Electromagnetic compatibility 89/336 CEE: Compatibilité électromagnétique	EN 61000-6-4:2001 EN 61000-6-2:2001
EG-Baumusterbescheinigung: EC-Type Examination Certificate: Attestatin d'examen CE de type:	BVS 05 ATEX E 071 X Exam BBG Prüf-und Zertifizier GmbH Dinnedahlstr. 9 44809 Bochum/Germany
Qualitätssicherung Produktion: Production quality assessment: Assurance Qualité Production:	BVS 06 ATEX ZQS / E 188 CE 0158 Exam BBG Prüf-und Zertifizier GmbH Dinnedahlstr. 9 44809 Bochum/Germany

Neuenrade, den 07.07.2006

Ort und Datum der Ausstellung  
Place and date of issue  
Lieu et date d'établissement

  
**Axel Vedder**  
Technischer Leiter  
Technical Director  
Directeur Technique

## Notes

**Notes**



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